NOTES ON GASTRIC SECRETIONS IN NEUROCIRCULATORY ASTHENIA.

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The problem of neurocirculatory asthenia has probably aroused more discussion than any other in the realm of internal medicine during the last year of the war. The English, under the leadership of Mackenzie and Lewis, early attacked the problem and studied it from many angles. In the United States active interest became acute with the examination of large numbers of soldiers for admission to the service and with the return of soldiers from France who had been unable to stand the strain on account of the appearance of certain symptoms referable in part to the cardiovascular system and in part to the nervous system. The question of the pathogenesis of the condition has aroused particularly earnest study, but nothing definite has been determined; indeed, the viewpoint of English and American students of the problem seems to be extremely divergent. The one point upon which there is a certain unanimity of opinion is that the individual suffering with neurocirculatory asthenia is, to start with, constitutionally a neurotic or substandard type. In the United States many recruits were weeded out by examining boards because they were of this type and suffered from many symptoms in addition to those referred to the heart. Many soldiers were sent to France who were of this type, but in whom the manifestations of the disorder remained latent until they were put in position of acute stress. Under such conditions they broke down and were sent to the rear.

The uniformity with which soldiers developed symptoms of neurocirculatory asthenia after engaging in actual combat has led many of the internal medical men, including Lieut.-Col. A. E. Cohn, the cardiac consultant of the A. E. F., to look upon the condition as a fear neurosis, pure and simple. A soldier, constitutionally inferior to start with, under the stimulus of fear, becomes extremely neurotic. Various symptoms develop, all without anatomical basis, and many referred to vagus irritability, and, as Friendländer and Freyhof[1] say, without any one symptom predominating. In a short time the soldier becomes introspective, self-centered and the condition of neurocirculatory asthenia becomes full-blown.

As the relationship between the nervous system and the stomach is so close it was thought that, considering these cases as types of marked disturbance of the nervous system, with particular emphasis on the vagus, the study of the gastric secretions, if the gastric secretion was found disturbed, could throw some light on the question (1) of vagal irritability and (2) would possibly add further clinical evidence, which would aid in determining the diagnosis of a condition which at best represents a group of symptoms without being a definite clinical entity.

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[1] Intensive Study of Fifty Cases of Neurocirculatory Asthenia, Arch. Int. Med., 1918, xxii, 693.

To review briefly and succinctly the physiology of the stomach, it will be recalled that Pawlow[2] first demonstrated that gastric secretion is under the control of the nervous system and that the secretory fibers are in the vagus. Howell[3] says that secretion is due to the action of the vagus, as can be shown readily by animal experiment. Further steps in the physiology of secretion include the secretion from secretagogues contained in the food and from those in the products of digestion. After the usual test-breakfast the gastric acidity usually reaches a total of about 60 in terms of decinormal sodium hydrate solution and about 45 for the free hydrochloric. Hyperacidity, that is, high acid contents of the gastric contents, is frequently met with in conditions unaccompanied by structural changes in the stomach or other abdominal viscera. It is, according to Hewlett,[4] "particularly frequent in young individuals and in those of a nervous temperament . . . whenever they are placed under an unusual nervous strain and those who follow occupations that involve much care and worry. . . ." A young soldier of a constitutional nervous temperament subject to emotional disturbance, returned from the active front, represents perfectly the picture described by Hewlett of those likely to suffer from symptoms of hyperacidity, and it is just such a soldier who is likely to be the subject of neurocirculatory asthenia.

Fractional gastric analyses were made upon many soldiers suffering from simple tachycardia, tachycardia from poisoning by inhalation of deleterious gases and similar conditions. Eleven soldiers presented the characteristic subjective symptoms and objective findings of undoubted neurocirculatory asthenia. Some of these latter individuals were seen in consultation with Lieut.-Col. Cohn. As controls the gastric secretions of eleven soldiers suffering from minor surgical and medical conditions were studied. The clinical records of two patients may be selected as examples of the general type of case of neurocirculatory asthenia with which we were dealing.

ABSTRACT OF FIELD MEDICAL CARD.

CASE I.—H. B., Corporal, Company M, 166th infantry.

Camp Hospital No. 30. Date of admission, August 27, 1918. Diagnosis: F. U. O. Chronic endocarditis.

Base Hospital No. 116. Neurocirculatory asthenia; effort syndrome. Date of admission, September 11, 1918. Has had pains in chest and becomes easily exhausted for the past three months. Gets up at night fighting for air.

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[2] The Work of the Digestive Glands, 1902, London.

[3] Text-book of Physiology, 1918, 6th edition, Philadelphia, p. 775.

[4] Functional Pathology of Internal Diseases, New York,, 1918 p. 143.

Examination. Apparently dyspneic; hands cold and purplish. Cardiac action fast but regular as to rhythm. No murmurs. Lungs negative. Abdomen negative.

September 14, 1918, evacuated.

Base hospital No. 20. Date of admission, September 15, 1918. Civil occupation, shoemaker (cobbler). Habits as to alcohol, good. Family history, negative. Previous personal history, diphtheria. fifteen years ago. Venereal history negative. When walking fast becomes very dyspneic and at times has considerable precordial and substernal pain. At night no longer awakens with air hunger, but these pains come at irregular intervals while asleep, awakening him two or three times a night and then going a night or two without them.

Examination. Facies anxious and troubled. Heart dulness apparently normal; nothing noted but a tachycardia. Has some slight tremor; pulse, 80 (sitting); immediately after exercise, 132; two minutes later, 100. Diagnosis: neurocirculatory asthenia.

September 21. Think this man should be put in exercise class for D. A. H. Sent to Disability Board for classification. Classified "C."

GASTRIC ANALYSIS.

	Free acid.	Total acidity.
1	12	33 (30 minutes)
2	20	69 (45 ")
3	41	71 (60 ")
4	45	74 (75 ")
5	50	90 (105 ")
6	43	67 (135 ")

CASE II.—J. B. M., private, 13th Field Artillery, Company C., Field Hospital No. 19. Diagnosis: fracture of the left foot.

Hospital No. 4. Roentgen ray of the left foot by fluoroscope. Unable to see fracture of fibula. Entered Emergency Hospital No. 7, August 3, 1918; foot greatly mangled.

Base Hospital No. 20. Aged thirty years. Race: white. Service, ten years. Birthplace: Illinois. Source of admission: training camp. Occupation: steeplejack. Tropical service: none. Habits as to alcohol: moderate. Family history: negative. Previous personal history: negative. Casualties: none. Venereal history: negative. Fracture of the left foot was caused by a wheel running over the foot. Also contusion of right shoulder. Two roentgen rays taken. Occurred August 2, 1918, about 2 A.M., on the Sergy front.

September 11. Movements of arm are freer and less painful than they were one week ago.

September 19. Cast removed; bones well knitted; foot strapped.

October 30. Is very nervous and at times unable to hold himself.

At night complains of shortness of breath, the result of a cutting pain which starts in the chest and runs down the arm. Is dyspneic upon exertion, also the result of this pain, and becomes dizzy and light-headed. Has a nasal obstruction which seems to cause him much mental worry and adds more symptoms to his neurasthenic mind. Was always a healthy child, but wet the bed when a youngster and was nervous.

Examination. No palatine and corneal reflex. Tremor of hands, coarse; deep reflexes exaggerated. Lungs are clear throughout. Heart sounds are normal; no murmurs; tachycardia. Pulse before exercise, 118; immediately after, 180; two minutes later, 128. Opinion: "In view of this soldier's well-marked neurotic taint, his subjective symptoms, tachycardia and poor response to exercise, believe he has neurocirculatory asthenia. Case quite well marked; will be unable to do first line duty. Should be in D or C class, and should have medical treatment."

GASTRIC ANALYSIS.

	Free acid.	Total acidity.
1	44	73 (30 minutes)
2	59	88 (45 ")
3	61	85 (60 ")
4	75	113 (75 ")
5	87	118 (105 ")

Test for lactic acid, negative. Test for occult blood, negative. Microscopic examination shows nothing remarkable.

RESULTS OF THE GASTRIC ANALYSES. The test-meal, consisting of 100 gm. of bread and a glass of water, was given about 7.30 A.M. on the fasting stomach. At the end of 30 minutes the duodenal tube was passed and approximately 10 c.c. of the gastric contents extracted. A similar amount was then extracted every 15 minutes until 75 minutes had passed (two subsequent extractions followed a half-hour and an hour later). The specimens of gastric contents were promptly titrated for free hydrochloric and total acidity at the end of this time.

The 11 cases of neurocirculatory asthenia showed a uniformly higher acidity average than the control cases. The acidity reached its highest at the end of 105 minutes and fell very slightly at the end of 135 minutes. Likewise the figures at the end of 75 minutes were only somewhat slightly less than the figures of the succeeding period. The average total acidity for these three periods was 83.9, 86.3 and 84.6. The average total acidity of the control cases reached its highest level likewise at the end of 105 minutes but fell sharply in the succeeding half-hour. The figures for the three last periods were 64.5, 67, and 56.6. None of the neurocirculatory asthenia cases showed a low total acidity. The case showing the lowest figures until the last two specimens was still rising when the tube was withdrawn, the total acidity at that time being 80. Of the 11 control cases all but 2 reached their highest level either 60 or 75 minutes after taking the test-meal. The 2 cases showing the highest total acidity reached their highest level 105 minutes after eating, and so high were their figures that they were sufficient to raise the average of the 11 cases at the end of this period above the average figures of the preceding period.

TABLE I.

6	27	10	38	32	80	36	96	40	102	38	104
12	33	20	68	20	56	26	58	28	62		
		29	69	41	71	45	74	50	90	43	67
44	73	59	88	61	85	75	113	87	118		
35	89	46	93	49	93	59	105	73	114	69	104
41	61	36	62	38	64	36	66	33	61	43	79
41	95	59	83	45	90	50	89	26	88	37	84
12	48	18	40	20	50	46	70	42	70	48	78
0	6	0	12	48	68	56	64	66	84	58	80
14	42	20	50	16	58	28	62	30	62	46	88
76	105	55	87	78	103	85	125	70	98	50	78
9)275	9)579	11)352	11)690	11)448	11)818	11)542	11)922	11)545	11)949	9)432	9)762
Av. 30.6	64.4	32.0	62.7	40.7	74.4	49.3	83.9	49.5	86.3	47.0	84.6

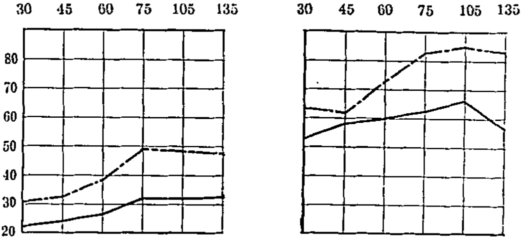
Free hydrochloric acid and total acidity of eleven cases of neurocirculatory asthenia, with average for periods of 30, 45, 60, 75, 105 and 120 minutes after ingestion of test-meal.

TABLE II.

14	64	10	52	16	64	20	58	16	34	10	20
12	38	0	22	10	48	20	70	18	60	20	64
		29	86	26	62	20	46	22	54	28	10
48	76	50	82	50	76	54	74	54	72	50	76
40	66	20	34	20	30	12	35	14	66		
10	22	19	36	21	55	18	39	28	56	32	47
32	87	48	88	36	68	68	104	62	104	72	102
4	11	10	37	22	47	28	37	29	41	26	34
28	60	22	77	25	60	50	90	45	87	35	66
32	75	45	89	47	87	47	94	35	115	33	75
17	29	30	54	42	69	34	64	22	48	20	34
10)237	10)528	11)283	11)657	11)315	11)666	11)371	11)710	11)345	11)737	10)326	10)566
Av. 23.7	52.8	25.7	59.7	28.7	60.5	33.7	64.5	31.4	67.0	32.6	56.6

Free hydrochloric acid and total acidity of eleven normal soldiers with average for periods of 30, 45, 60, 75, 105 and 120 minutes after ingestion of test-meal.

The neurocirculatory asthenic cases showed much the same relation in the free hydrochloric figures as was shown in the total acidity; that is, the highest values were reached at the end of 105 minutes—49.5—while the figures for the preceding and succeeding half-hour were respectively 49.3 and 47. With the control cases the free hydrochloric reached its highest level, 33.7, at the end of 75 minutes, the figures for the preceding period and the last period being 28.7, 31.4 and 32.6 respectively.



Solid lines, normal individuals; broken lines, neurocirculatory asthenia cases. Chart to left, free HCl; to right, total acidity.

Conclusion. In patients suffering with neurocirculatory asthenia there is a very definite increase in the total acidity and free hydrochloric acid as compared with controls. These figures do not represent abnormal hyperacidity. As Rehfuss[5] has shown that the usual conception of hyperacidity is erroneous, an apparently normal acidity of over 100 is common. They do show, however, that almost uniformly soldiers suffering with neurocirculatory asthenia as contrasted with apparently normal soldiers, both eating the same food, under identical routine and under the same conditions of living, show a higher gastric acidity. This is a diagnostic point which may be of value in differentiating the disorder in questionable cases. It surely seems to add further evidence to that already accumulated that these soldiers are suffering from a neurosis with which is probably associated a hyperirritable vagus.

NEWER CONCEPTIONS OF THE PATHOGENESIS AND TREATMENT OF EMPYEMA.*

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Empyema is one of the oldest diagnosticable diseases. It was known even to Hippocrates. It cannot be said, however, that its study and treatment have received the precision and refinement

[5] Possibilities of Fractional Gastric Analysis, Jour. Am. Med. Assn., 1918, lxxi, 1534.

[*] The Mütter Lecture read before the College of Physicians of Philadelphia, December 12, 1919.